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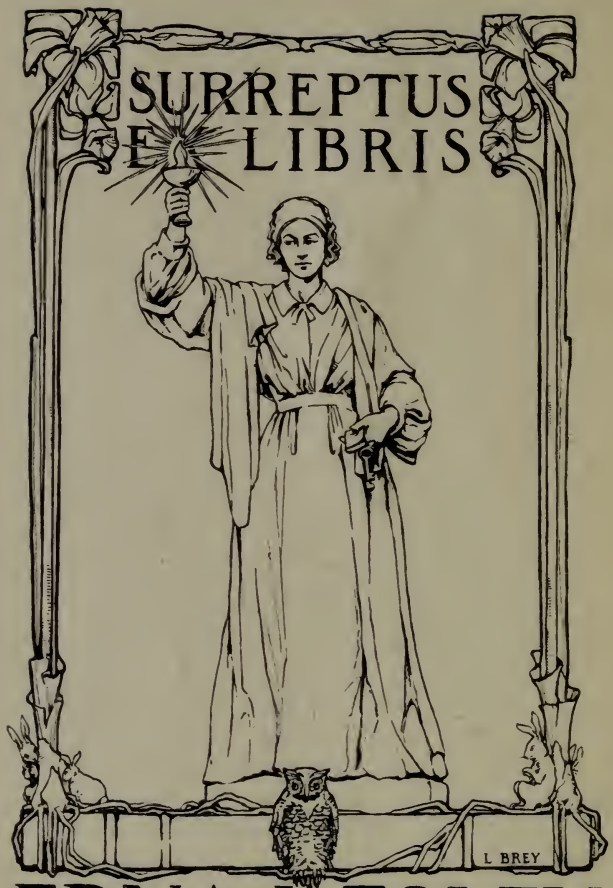

EDNA L. FOLEY

Edna L. Foley.

London
1914

Presented to the

Hartford Hospital School of Nursing

in memory of

Martha J. Wilkinson, Class of 1890

Hartford's first visiting nurse

by her friend

Edna L. Foley, Class of 1904

THE TUBERCULOSIS HANDBOOK

FOR

HEALTH VISITORS AND NURSES

ALSO FOR THE USE OF SOCIAL WORKERS, HEADS OF FAMILIES AND OTHERS

BY

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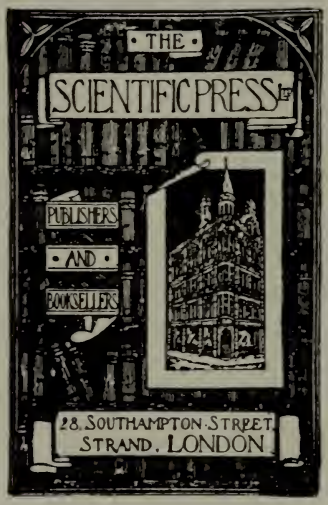
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PREFACE.

THE purpose of the writer of this book has been to give as concisely as possible those facts about Tuberculosis which Health Visitors and Nurses engaged in this special work should be familiar with.

His experience in teaching Nurses has shown him the difficulty of combining accuracy with simplicity; and so theoretical questions and those belonging to the doctors' province have been avoided.

It is to be regretted that so few opportunities exist at present for Nurses to acquire a practical knowledge of the subject, and the courses of instruction existing at a few Chest Hospitals might be widely extended.

The author's indebtedness to the various modern writers on the subject must be acknowledged. He also wishes to express his thanks to those who have lent blocks for illustrations.

A. H. G. B.

July, 1914.

INTRODUCTION.

THE great strides in our knowledge of diseases which have been made in recent years have been largely due to the discovery that many were caused by organisms, so small as to be only visible under the microscope, viz. *bacteria.* They are the lowest known forms of vegetable life.

These bacteria require special substances (or media) to grow upon outside the body and will only flourish at certain temperatures. They multiply by simply dividing into two, and then re-dividing, and so on. Some of them, however, form rounded bodies or spores which are very resistant to heat and drying. They are therefore very difficult to destroy. Bacteria are of various shapes. Some are rod-like, and are then termed *bacilli*, and others, which are round, are called *cocci.* The bacteria which cause tuberculosis are

FIG. 1.
Diagram of Cocci.

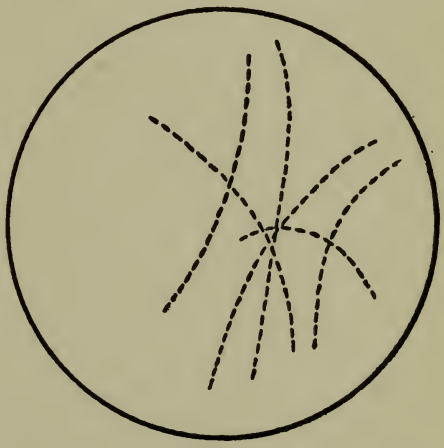

FIG. 2.
Diagram of Bacilli.

bacilli, while some of those which cause pus, as in a gathered finger, are cocci.

When a person "catches" an infectious disease, he has been attacked by the bacteria causing that disease. The bacteria, getting into the body, multiply and form poisons which produce the symptoms of the disease. Whether people are susceptible or not to the attack of these bacteria depends on causes which are incompletely known. Some people are naturally much less susceptible to certain diseases than others. That is to say, they are naturally immune. Others having passed through an attack of the disease have acquired insusceptibility or immunity.

It has been discovered that it is possible to artificially produce immunity in people. For instance, anti-diphtheritic serum is prepared by injecting Diphtheria bacilli into a horse; and by repeatedly doing this the horse's blood serum produces substances known as *anti-toxins*, which are antagonistic to the poison, or *toxin*, which the diphtheria bacillus forms. If the horse is then bled and the serum separated from the clot, the blood-serum injected into a patient suffering with Diphtheria has curative properties.

Another way to produce immunity in persons is to stimulate their white blood-corpuscles to increased action. It is well known that these act as the scavengers of the body by eating up bacilli and destroying them. If dead bacilli are injected into a person his white blood cells are stimulated to act against the

particular kind of bacillus injected, and if he is suffering from a disease due to this bacillus, the white blood cells will destroy the bacilli causing the disease and so assist in his cure. This way of curing a disease is known as vaccination, and the mixture of bacilli injected is known as a *vaccine.*

The first method of curing a disease is much the most certain if a serum is obtainable.

A person may be more susceptible to an attack of disease if his general resistance is lowered by overwork, insufficient feeding, and similar causes.

Some bacteria cause acute diseases, such as Diphtheria, Typhoid Fever, etc., and others, like the tubercle bacillus, cause as a rule, chronic diseases.

If, however, the invasion of the organism occurs in a very susceptible patient, and the poisons it produces are sufficiently virulent, a very acute illness will follow, ending very soon in death. This is seen in most of the fevers, and a corresponding condition is seen in acute miliary tuberculosis (Chap. VIII), the poisoning or *toxæmia* produced by the bacilli being so great as to lead to fatal results very early.

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CHAPTER I.

WHAT IS TUBERCULOSIS?

TUBERCULOSIS is any infection due to the tubercle bacillus. Other terms are sometimes used to describe it : for instance, *Consumption* is used by some people to indicate tuberculosis of the lungs alone, whilst the word is frequently used by others for other forms, such as consumptive spine, consumptive bowels, etc. Phthisis (from the Greek, meaning wasting), the term given by many doctors to pulmonary tuberculosis alone, is used by others to indicate the disease affecting other organs, such as Phthisis of the larynx. Another popular phrase is to speak of people with tuberculosis of the lungs as " going into a decline ".

It is therefore better to keep to the term tuberculosis, indicating by the name of the organ the part affected, thus : pulmonary tuberculosis, tuberculous laryngitis, tuberculous enteritis, etc.

The **tubercle bacillus** is an organism only $\frac{1}{8000}$ of an inch in length. Under the high power of the microscope it is seen to be straight or a little curved. The bacilli may be demonstrated in the sputum or fæces of cases of pulmonary tuberculosis, sometimes in the blood (especially in severe cases), and in the urine in cases of genito-urinary tuberculosis. In order to demonstrate them special staining methods are necessary.

The nurse may be asked to assist the doctor by staining

the slides by the "Ziehl-Neelsen" method, ready for him to examine, and she should familiarize herself with the process.

The "Ziehl-Neelsen" method which is most commonly used, is as follows: The sputum to be examined is emptied into a wide dish, some of the yellowish masses picked out with two needles and placed on a microscope glass slide. A film is then made by drawing a second slide over the first, as illustrated, care being taken to ensure that the film is not too thick. It is then dried by holding well above

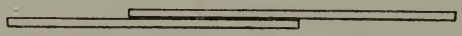

FIG. 3.

a Bunsen burner, and fixed by passing two or three times through the flame and then stained.

The following solutions are required for staining:—

1.	2.	3.
Fuchsin, 1 gm. Abs. Alcohol, 15 c.c. 5 per cent solution Carbolic Acid, 85 c.c.	25 per cent Sulphuric Acid.	Methylene Blue (saturated alcoholic solution), 20 c.c. 5 per cent solution Carbolic Acid, 80 c.c.

Enough of solution No. 1 is placed on the slide to cover the film and it is heated until it steams but does not boil. It should be kept at this point for five minutes, then washed with water and decolorized in solution No. 2 until the colour is a light pink. It is then counter-stained for a few seconds in No. 3.

The Antiformin method is sometimes used.

Antiformin consists of caustic potash and bleaching powder. It dissolves all bacilli except those like the Tubercle Bacillus, and the following process is used:—

1. One part of sputum and two parts 50 per cent antiformin are shaken up together.

2. When this mixture is homogeneous, three parts of rectified spirits are added, and the whole centrifuged for 1 minute.

3. The lowest part is taken out with a pipette and treated like the sputum in the "Ziehl-Neelsen" method.

When so stained and examined under the microscope the bacilli are seen as short red rods and the pus cells of the sputum are stained blue, as illustrated in Fig. 4.

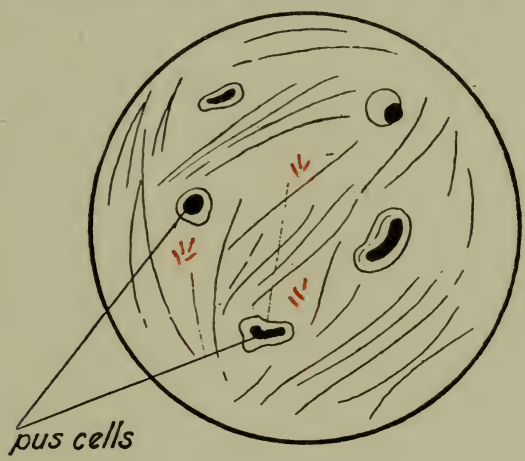

FIG. 4.

When a person becomes infected with tuberculosis, the tubercle bacilli cause a heaping together of connective tissue cells, which to the naked eye appear as small, grey, bead-like nodules or *tubercles*. (It is from this characteristic that the name Tuberculosis has been given to the disease.) The cells break down or caseate and suppuration and the formation of pus follow.

In acute conditions nothing is seen on post-mortem examination but a studding of the organs with the above so-called miliary tubercles. In chronic conditions there will be the breaking down conditions with resulting cavities in the

organ affected. Such is the effect of the tubercle bacillus on the organs of the body, and it may attack any organ.

Whilst the most common site of tuberculosis of the lung when diagnosed by the stethoscope is the apex, many hold, especially X-ray workers, that disease here is secondary to disease at the root of the lung. The disease is then supposed to start as an inflammation round the bronchial tubes, "peribronchial phthisis," and spreads radially to the apex which, being supposed to be more vulnerable, is more quickly destroyed by the disease. When tuberculosis of the lung heals it does so by *fibrosis*, that is, the formation of scar tissue. This may occur even when cavitation has taken place, and the cavities be much reduced in size by the contraction of the scar tissue. When fibrosis occurs in a case of this sort the patient may live for many years, suffering constantly from shortness of breath.

The tubercle bacillus has a covering which makes it resistant to cold or dryness. It is killed by boiling but can resist dry heat. It is therefore important that sputum should never be allowed to dry. There are two kinds of tubercle bacilli which infect man, the *bovine* tubercle bacillus, which more commonly infects children, and the *human* tubercle bacillus, which may infect a person of any age.

There is another kind of tubercle bacillus, the *avian*, which is peculiar to birds.

CHAPTER II.

INFECTION WITH TUBERCULOSIS.

FORMERLY tuberculosis was considered an hereditary complaint. How often does not one hear the phrase that it "runs in the family". When in 1882 Koch discovered the bacillus causing the disease this theory lost hold, and whilst a few still believe in the transmission of the disease in this way, its supporters are not numerous. On the other hand, very many hold that an hereditary predisposition to infection is of importance either from inherited defects of chest development, or because of an inherited lowered resistance to the disease. The nurse will have noticed how frequently the "consumptive" has a long narrow chest. There is no doubt that infection after birth is of by far the greatest importance in causing tuberculosis.

There are other predisposing causes of infection which may be mentioned.

(*a*) Various trades, such as tin-miners, cutlers and needle makers, pottery makers, grinders, stone-masons, etc. The dust particles arising from such work set up an inflammation of the lung, which readily becomes the prey of tuberculosis, the sharper the particles of dust the more injury being inflicted to the lung.

(*b*) Other lung diseases such as pneumonia, pleurisy, either primary or following measles, whooping cough, etc.,

which by weakening the lung substance render it liable to subsequent tuberculous infection.

(*c*) Pulmonary tuberculosis frequently occurs in the later stages of the disease "diabetes".

(*d*) A blow may "light up" a pleurisy or a tuberculous joint or meningitis.

(*e*) Other general causes:—

(1) Unhealthy surroundings, damp houses, overcrowding, deficient ventilation and lighting, underfeeding.

(2) Alcoholic excesses, and any nervous or physical condition causing a great lowering of the resistance of the body to infections.

The soil being thus prepared there are various ways in which the tubercle bacillus may enter, as:—

1. *Through the intestines.*—In this way children may become infected by drinking milk from a tuberculous cow. The extent to which this occurs is disputed, some holding that most forms of tuberculosis in children are due to bovine bacilli, whilst others hold that milk infection is a minor cause. The most recent work by Mitchell of Edinburgh shows that in that city, bovine tuberculosis is of the greatest importance, but in other towns similar results have not been obtained. Probably infection with tuberculous meat, in consequence of the cooking which it undergoes, plays a minor part in causing the disease.

In cases where infection through the intestines occurs, the abdominal glands will be the chief seat of the disease, primary tuberculosis of the intestines being rare.

2. *Through the blood.*—Here the tubercle bacilli getting into the mouth are believed to adhere to the tonsils, secondarily infect the cervical glands, and then the bron-

chial glands at the root of the lung, a gland becomes attached to a branch of the pulmonary artery, the bacilli get into the blood stream and general tuberculosis is produced. In less severe infections the lung itself is attacked generally at the apex. Decayed teeth are also places where the tubercle bacilli may gain an entrance, having frequently been found in their cavities.

3. *Through the respiratory tract.*—This is the most important factor in tuberculosis of the lung. Cornet showed that if animals inhale either moist, sprayed, or dried sputum, in two or three weeks tubercles appear in the lungs.

It is probably only when the consumptive coughs that he becomes dangerous to those near him, a certain amount of fine sputum being discharged, and inhaled by the person in immediate contact. A case is recorded of a patient who lost four wives in succession from this disease. Tubercle bacilli can and have frequently been discovered on the walls, floors, and in the dust of hospitals, asylums, etc., where persons suffering with tuberculosis of the lungs have been living.

4. *Through the skin.*—Occasionally butchers, post-mortem attendants and others frequently handling tuberculous matter, become infected with a tuberculosis of the skin. It is doubtful if any other part of the body but the skin becomes infected by this means. The disease probably remains local in the skin.

The Royal College of Physicians has recently considered the question of infection with tuberculosis, and its report of 6 April, 1914, so well summarizes the question that it will be quoted here in full.

"ROYAL COLLEGE OF PHYSICIANS OF LONDON.

"The Royal College of Physicians, in view of the exaggerated fear of the infectivity of Pulmonary Tuberculosis entertained by the public, and with the hope of rendering assistance to those who have administrative duties in connection with this disease, desire to issue the following statement :—

"THE INFECTIVITY OF TUBERCULOSIS.

"1. Tuberculosis is an acquired disease, but certain constitutional types may be inherited which render the patient specially susceptible to infection and there is reason to think that such susceptibility is an inherited character.

"2. The infective agent is the Tubercle Bacillus. This may be contained in the various discharges and excreta of the patient, and especially in the sputum of those suffering from Pulmonary Tuberculosis. No discharge is infective unless it contains the Tubercle Bacillus.

"3. Cases of Tuberculosis of bones, glands, and internal organs from which there is no discharge or which do not furnish any excretion, and cases of arrested Pulmonary Tuberculosis, have never been proved to be infectious.

"(By arrest is here meant that all the symptoms and physical signs of activity have disappeared, and the sputum has either ceased or no longer contains Tubercle Bacilli.)

"4. The means by which Tubercle Bacilli may enter the body are :—

"(*a*) *By inoculation* through a wound or abrasion of the skin. This has occasionally occurred to workers in laboratories, post-mortem attendants and others dealing with tuberculous material, and is presumably the way in which Lupus is acquired.

"(*b*) *By inhalation.*—Susceptible animals are readily infected by the inhalation of air containing Tubercle Bacilli whether in droplets or suspended as fine dust, but in the spread of the disease among human beings the latter appears to be the more important means of infection. The sputum or other discharges, whether on soiled handkerchiefs, linen, garments, or elsewhere, when dried, may become pulverized, and in this condition may be readily dispersed in the air of a room. That droplets of sputum are less important agents of infection is suggested by the fact that the incidence of consumption upon the staff, nurses, and others engaged in hospitals for the treatment of tuberculous disease, where all discharges are carefully disposed of, is not above the average in the general population.

"(*c*) *By swallowing.*—Dust infected by the Tubercle Bacillus may be conveyed to food and so enter the alimentary canal; or infection may occur more directly in the act of kissing, or by consumptive and healthy persons using the same food utensils. As about 10 per cent of the milk supplied to large cities contains Tubercle Bacilli derived from infected cows, this avenue of infection is particularly important in the case of children. The Bovine Tubercle Bacillus is more commonly responsible for Tuberculosis in young children than in adults, but the proportion of cases due to it varies very much in different localities.

"There is no evidence that Tuberculosis can be conveyed to others either by the breath alone or by emanations from patients, or by their

garments, unless soiled by dried sputum or discharges.

"5. The spread of Tuberculosis is favoured by uncleanliness, overcrowding, and imperfect ventilation, and is hindered by the opposite conditions. Experience in hospitals and other institutions where the following precautionary measures have been thoroughly carried out indicates that by such measures the risk of infection is reduced to a minimum, namely—

"(*a*) The careful disposal and disinfection of the sputum and other discharges.

"(*b*) The disinfection or destruction of soiled handkerchiefs, clothes, and linen.

"(*c*) The removal of dust by frequent moist cleansing of the floors, walls, &c., of the rooms.

"(*d*) The supply of abundant air space, and free ventilation with fresh air.

"No risk is incurred by living in the immediate neighbourhood of Institutions for the treatment of Tuberculosis which are properly conducted.

["Copies of this statement can be had on application at the College.]

"*April*, 1914."

CHAPTER III.

THE AIR PASSAGES.

WHEN air is inhaled it passes through the nostrils, where it is warmed and freed from dust particles, thence through the pharynx into the larynx.

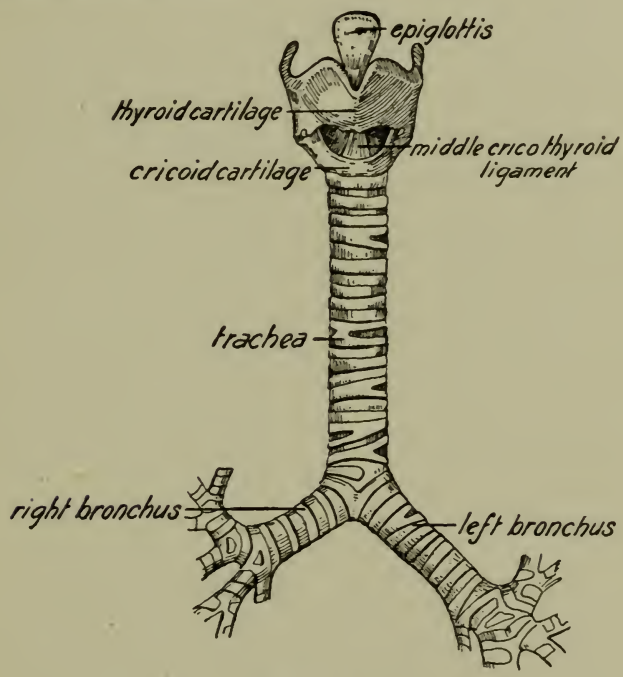

FIG. 5.

The larynx is the organ of voice and lies in the centre of the neck in its upper part, below the tongue, and is formed

of nine cartilages. The largest of these are the thyroid and cricoid. The thyroid cartilage is attached to the hyoid bone above and to the cricoid cartilage below. Externally it forms a prominent ridge, commonly known as "Adam's apple".

The cricoid cartilage is attached above to the thyroid cartilage, and below to the trachea, its shape being similar to that of a signet ring. The arytenoid cartilages are pyramidal in shape and rest on the posterior part of the cricoid cartilage. To the front angles of the arytenoid cartilages are attached the vocal cords which extend from them to the thyroid cartilage. These are formed of elastic tissue covered with mucous membrane and the aperture between them is called the rima glottidis. Above the true vocal cords are two folds of mucous membrane termed the false vocal cords. It is in the region of the arytenoid cartilages that a tuberculous infiltration of the larynx commonly occurs, or the process may start in the posterior end of a cord. This is because it is these parts of the larynx which are most richly supplied with lymphatics.

The epiglottis is a leaf-shaped cartilage attached by the stalk to the thyroid cartilage, and the broad portion lies over the entrance to the larynx.

The trachea is a tube directly continuing the larynx as far as the 3rd dorsal vertebra. It is composed of 16 to 18 rings of cartilage which are incomplete behind. Behind it lies the œsophagus. The trachea ends by dividing into two smaller tubes, the right and left bronchi, which are also formed of incomplete rings of cartilages. The angle between these bronchi is about 100° and the right is wider and more vertical than the left. Therefore foreign bodies gaining admission to the trachea are more likely to enter this one than the other.

Each bronchus enters its respective lung, the place of entry being known as the "root". When each does so it divides and sub-divides, becoming smaller in the process until the terminal tubes are reached. These are called bronchioles and expand into slightly wider cavities or infundibula which in turn have pouches or alveoli. The smaller divisions of the bronchi have no cartilages.

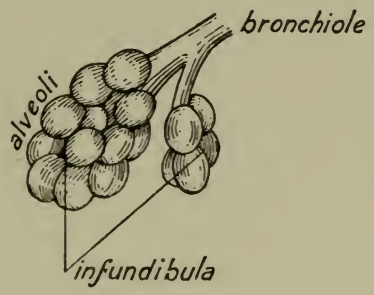

FIG. 6.

The alveoli are formed of connective and elastic tissue, and near the surface of each is a network formed by the pulmonary artery.

The blood brought to the lungs by the pulmonary artery is impure blood from the right auricle, to which it has come from the veins of the body. In the alveoli the blood is only separated by a thin layer of cells from the air, and the hæmoglobin of the red corpuscles absorbs oxygen. The carbon dioxide in the blood is given off into the alveoli and thence passes out with expiration.

The blood thus becomes aerated and returns by the pulmonary veins to the left auricle.

The lungs are conical in shape, and each has an apex extending into the neck above the clavicle and a base resting on the diaphragm, the right lung being a little shorter owing to the liver pushing the diaphragm upwards on that side.

The right lung has two fissures, partially sub-dividing it into three lobes, upper, middle, and lower. The left lung is partially divided into two lobes by a single fissure. The *root* of each

lung is on its inner surface and found in it are the pulmonary arteries and veins, the bronchus, the bronchial arteries and

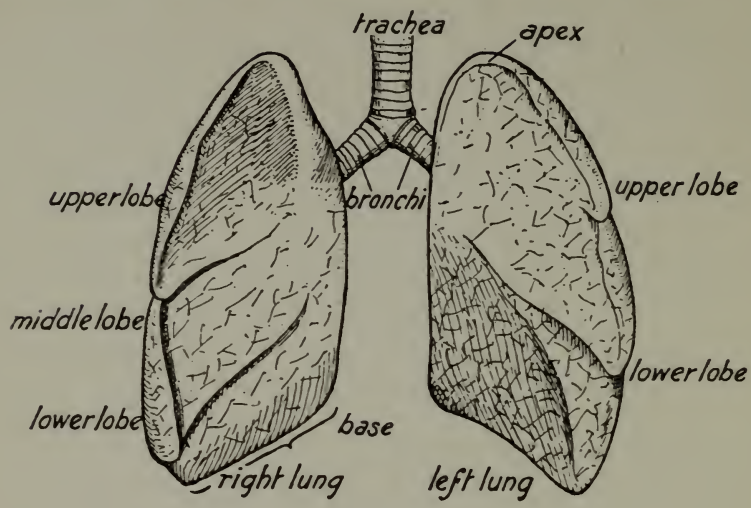

FIG. 7.

veins, the pulmonary nerves and lymphatics, and some

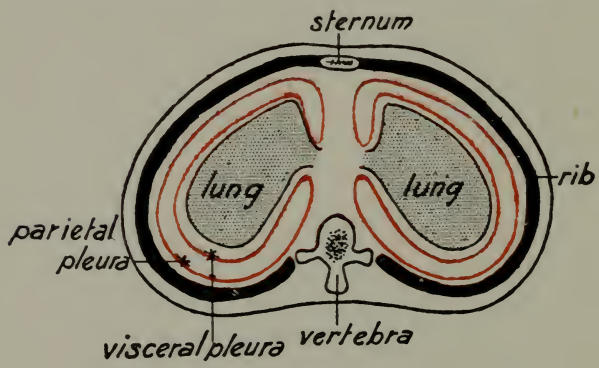

FIG. 8.

bronchial glands. Each lung is covered by a thin membrane (visceral pleura) reflected off the lung at its root to the wall

of the thorax (parietal pleura). This membrane or pleura secretes a little fluid which enables the two opposed surfaces to glide easily on each other. If it becomes inflamed, as in pleurisy, friction may occur between the surfaces causing pain, or an excess of fluid (pleuritic effusion) may take place.

CHAPTER IV.

THE SYMPTOMS AND COURSE OF PULMONARY TUBERCULOSIS.

SINCE one of the nurse's most important duties may be to inquire into cases of tuberculosis of the lung with a view to discovering other unknown cases, it is important for her to know the symptoms of the disease. These may be given as follows:—

1. *Cough.*—To be of importance this must have lasted, perhaps intermittently, for some time.

2. *Expectoration.*—This may be of various kinds, usually frothy and mucoid in the early stages. When cavitation is present the sputum contains small yellowish lumps, the so-called "nummular" sputum.

3. *Hæmoptysis* (blood spitting).—This may be the first sign of the disease in a patient or it may be the blood-stained sputum of a chronic case. It may vary from a slight trace of blood to a profuse hæmorrhage leading to collapse and possibly the death of the patient.

4. *Loss of weight.*—The complaint that a patient is getting thinner, and has a slight cough, may be the first indication of the disease.

5. *Night sweats.*—These may also occur in the early stage of the disease.

6. *Shortness of Breath* (dyspnœa).—This is very

marked in advanced cases where a large portion of the lung is involved.

7. *Anæmia.*—This is common, but not at all invariable in the early stages.

8. *Loss of appetite* and symptoms of dyspepsia.

9. *Feverish symptoms.*—The fever may in early cases only be brought out by exercise. In advanced cases the evening rise of temperature will be unmistakable.

The onset of cases of tuberculosis of the lung varies. Occasionally the first sign is a sudden hæmoptysis. Other cases follow on an attack of pleurisy, the patient gradually developing signs of tuberculosis. Frequent attacks of bronchitis may be due to this disease.

More rarely the disease begins by an acute attack simulating pneumonia in which, however, a "crisis" does not occur, and a fatal result ensues.

More commonly, the attack is insidious. The patient complains of lassitude, weakness, some cough perhaps not marked, and there is some anæmia. Complaint of dyspepsia is frequently made. If at this stage the disease is diagnosed and the patient is sufficiently resistant, the process can be arrested by suitable treatment. If, however, the patient's resistance is weak or he remains at work without treatment, spread of the disease follows. The patient then assumes the typical consumptive's appearance. He acquires a hectic flush, his thin, stooping frame is constantly racked by a hacking cough, bringing up blood-stained sputum. He complains of drenching sweats at night, and his sunken, pale face with a delicate flush on the cheeks, and glittering eyes is very typical.

The time before which this stage is reached depends on the resistance of the patient to the disease, and therefore is variable.

At a later stage the patient becomes confined to bed through increasing weakness. His larynx may become affected, causing hoarseness and pain on swallowing. He may suffer from incessant diarrhœa from his intestines becoming infected, or from hæmoptysis from ulceration involving a blood vessel in his lungs. He is extremely wasted and may get bed-sores from the rubbing of his bony prominences which are now but little protected either by muscle or fat.

Death finally closes the scene, either by gradual failure of strength, by heart failure, or from a profuse hæmoptysis. If the patient's resistance is good he may never reach the second or third stages of the disease. In one series of post-mortem examinations, healed tuberculosis of the lung was found in 30 per cent of the cases, consequently, natural cure must be a fairly common occurrence.

The disease in the lungs commonly starts at the upper lobe of the lung, 1 inch below the extreme apex. From this it spreads to the lower lobe of the same lung, and in time to the apex of the opposite lung. The changes going on are those of tubercle formation, softening, and cavity formation, as described in Chapter I, but the stage of the disease in the lung does not coincide with the condition of the patient. Many patients with cavity formation have better prospects of life than those with early disease in the lung but with much "toxæmia".

Tuberculosis of the lung in children.—The appearance of children liable to suffer from tuberculosis has frequently been described. One type is characterized as a thin, fragile, pretty child, with active lively temperament, long soft hair and bright eyes. The skin is pale and underneath are seen networks of veins.

The other type is a heavily built, phlegmatic child with a

fat, pasty appearance. Tuberculosis of the lungs in children of school age is probably not common, not more than about 5 in every 1000 children attending school are found to suffer from it; but if all the children who are away ill with the disease were included the number would no doubt be higher.

The younger the child the less favourable is the prospect of cure, as in infancy tuberculosis tends to become general in the body much more readily than it does in later years.

The diagnosis of pulmonary tuberculosis in children is difficult. Sometimes there are only signs of bronchitis, and sometimes there is a chronic broncho-pneumonia. Very commonly the bronchial glands in young children are affected, giving rise to a chronic cough. In these cases an X-ray examination will assist in the diagnosis. Secondarily to the bronchial glands the lower lobe of one lung may be diseased. In older children disease at the apex is more common. Since children rarely cough up sputum, but swallow it, its examination can only infrequently be carried out. The most hopeful prospect in children is to catch them in the stage before tuberculosis has set in and transfer them to a healthy, open-air life. The visitor can assist in this by reporting delicate children in tuberculous surroundings to the Tuberculosis Officer who will advise an open-air school or other similar treatment.

Tuberculosis of the lung in old people.—In old people tuberculosis of the lungs is not uncommon. It frequently is mistaken for a chronic bronchitis and is very chronic in its course. The examination of the sputum of all patients who expectorate is therefore of the greatest importance, and the nurse should never be put off with the story that because a patient is old and has had a cough for long that therefore he cannot be tubercular.

CHAPTER V.

THE TREATMENT OF PULMONARY TUBERCULOSIS.

1. *Tuberculin.*

TUBERCULIN is a substance prepared from dead tubercle bacilli by either the extraction or emulsion of their bodies. It was first introduced by Koch in 1890, but owing to the large doses used it did more harm then good in cases of tuberculosis of the lung. When injected into a tuberculous patient in sufficiently large doses it produces reactions which are described as local, general, and focal.

1. *Local.*—The local reaction consists of swelling and pain at the site of injection.

2. *General.*—The general reaction consists in a rise of temperature with symptoms like headache and pains in the limbs.

3. *Focal.*—The focal reaction consists in an inflammation occurring at the site of the disease. In that of the lungs there will be increased sputum, perhaps with blood, pain in the chest, and sometimes tubercle bacilli will be found in the sputum in which they were not previously found. The bad results obtained at first with tuberculin were due to the doses being so large as to produce an excessive focal reaction with consequent spread of the disease.

If, however, the tuberculin is given in very small doses slowly increased, the patient becomes tolerant to it, no

reactions may be produced, and the general condition may be improved.

The value of tuberculin in cases of tuberculosis of the lung has been much debated. There is no doubt that its use has to be carefully safeguarded and that its value is much enhanced if the patient has been previously treated at a sanatorium.

There are many tuberculins prepared from both human and bovine bacilli. All those having the initial "P" are bovine (German, Perlsucht). Thus human tuberculins are such as O.T., A.F., B.E., T.R., and bovine include P.T., P.T.O., P.B.E., of those in common use.

It is common to commence the treatment with a tuberculin which is not very likely to produce a violent reaction, therefore a bovine tuberculin such as P.T.O. is first used, going on to a stronger one, P.T., and finally to O.T., which is the original tuberculin of Koch.

Other doctors use B.E. throughout the treatment.

The treatment is started by a minute dose of a very dilute solution of tuberculin such as ·00001 c.c. P.T.O., and the tuberculin as it is prepared by the makers has therefore to be diluted. The dilution is made with a solution of equal parts of ·5 per cent salt solution and ·5 per cent carbolic acid solution as follows :—

The dilutions to be prepared are such that

1 c.c. of Dilution		I =	·1 c.c. P.T.O.
1 c.c. ,,	,,	II =	·01 c.c. P.T.O
1 c.c. ,,	,,	III =	·001 c.c. P.T.O.
1 c.c. ,,	,,	IV =	·0001 c.c. P.T.O.
1 c.c. ,,	,,	V =	·00001 c.c. P.T.O.

A record syringe may be used. For Dilution I, 1 c.c. of the original P.T.O. is diluted with 9 c.c. of the carbolic solution. For Dilution II, 1 c.c. of Dilution I is diluted

with 9 c.c. of the carbolic solution ; and for Dilution III, 1 c.c. of Dilution II is diluted with 9 c.c. of the carbolic solution, and so on.

The record syringe (illustrated) holds 1 c.c. and is graduated in ten divisions, one of which therefore holds $\frac{1}{10}$ c.c. Each of these is again divided into five divisions, so that each small division is $\frac{1}{50}$ c.c., or 0·2 c.c.

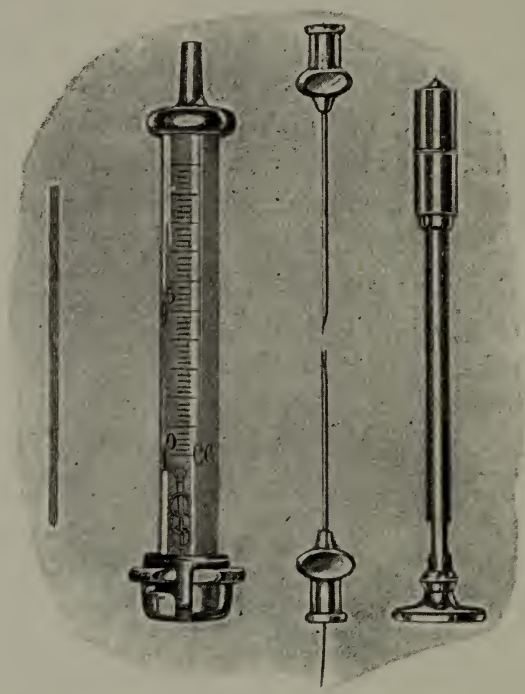

Fig. 9.

The tuberculin so prepared is stored in small sterilized bottles. The doctor will usually prepare his own dilutions, but there is no reason why the nurse should not be able to do so if called upon.

Besides being used for treatment, tuberculin is also used for diagnosis as follows :—

1. *Von Pirquet's Test* consists in scratching the forearm with such a lancet as that shown, carefully sterilized, and a drop of Koch's original tuberculin (O.T.) placed on the scratch and allowed to soak in for some minutes. The arm is examined twenty-four to forty-eight hours afterwards, and if the patient is suffering or has suffered from tuberculosis a small red circular swelling or papule is produced.

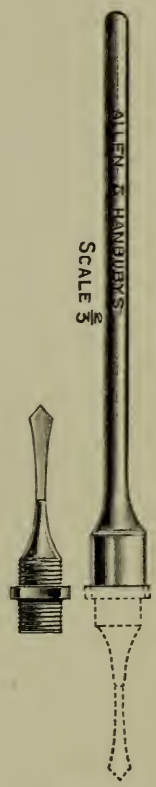

FIG. 10.

As most people have suffered at one time or another from tuberculosis, the value of the reaction in all but children is not great. An attempt has recently been made to estimate the sensitiveness of a patient to tuberculin by the size of the papule produced with different strengths of tuberculin. This is known as the Quanti-Pirquet reaction.

2. *Moro's Test.*—This consists in rubbing into the skin of the abdomen an ointment containing Koch's old tuberculin. In positive cases small red papules, nodules, or even vesicles are produced in from one to four days. This test frequently fails and is only used in young children.

3. *Calmette's Test* consists in dropping into the eye one drop of a 1 per cent solution of Koch's O.T. A positive reaction consists in a reddening of the conjunctiva, appearing in four to eight hours. The test is not much used now as serious results in the eye have followed its use, and it frequently fails unless a strong tuberculin solution is used, and this is not warranted.

4. *Subcutaneous Test.*—This consists in injecting various strengths of tuberculin and observing if any reactions are

produced. The strengths generally used are ·0002 c.c. O.T.; if no reaction is produced ·001 c.c. O.T. is injected after a few days. Should this produce no reaction ·005 c.c. O.T. are injected after a further interval.

The reactions to be observed have already been described. A focal reaction is the only definite proof of active tuberculosis, but if the patient reacts at all to a small dose the evidence is strong. This test will only be applied to cases in which the temperature is normal, and the temperature must be carefully taken four times a day, before and after the test.

The dangers of producing a focal reaction are obvious, and the method will only be used with great caution by the doctor.

If a reaction is produced in treating a patient with tuberculin, the doctor instead of increasing the dose will either inject the same dose or a smaller one. The treatment will not be given in cases which are much advanced, and will not be used in those with much pyrexia, at any rate in patients who are being treated at a Dispensary. Where, however, patients can be kept under constant observation, tuberculin may be used to reduce fever where this is not high.

The important guides in treating a case with tuberculin will be (1) the temperature, (2) the weight, and (3) the pulse rate. Some patients are very intolerant to tuberculin and the treatment has to be abandoned. As a rule children with definite signs of tuberculosis of the lungs do not bear the treatment well.

The exact mode of action of tuberculin is complicated and only partly understood. It is best thought of as stimulating the tissues of the body to produce substances antagonistic to the tubercle poison.

CHAPTER VI.

THE TREATMENT OF PULMONARY TUBERCULOSIS.

2. *Sanatorium.*

THE sanatorium treatment of this disease has now earned the first place among therapeutic measures. The chief influences at work in a sanatorium in beneficially influencing the course of the disease are (1) open-air life; (2) rest; (3) graduated labour, and (4) diet and hygiene.

The influence of an **open-air life** on those who have been living a confined one leads to a very great improvement in the general condition of the patient. In order to do this, however, the air to be breathed must be pure and free from dust. The site of a sanatorium has therefore to be carefully selected. It should be on rising ground and if possible on a southerly slope, but sheltered from winds. It should have a dry soil. Sanatoria are usually built in two types, either in "chalets" (see Fig. 11), which are small rooms isolated by some distance and holding only one or two patients. The advantage of this is the readiness of ventilation and the quiet which the patient enjoys; but if the patient is in bed, the difficulties of heating and sanitary arrangements are obvious.

The other type consists of a central block, containing kitchen, dining-rooms, nurses' quarters, etc., with pavilion wards arranged round, the pavilion being provided with

verandahs (see Fig. 12). In addition, shelters are required in which patients who are well advanced in their convalescence may sleep. Larger shelters are required for recreation in wet weather.

FIG. 11.

Patients who are feverish will be best kept in rooms by themselves, the others will sleep in the main wards. To avoid dust, in a modern sanatorium all corners and ledges will be rounded, and the nurse will be careful in dusting not to raise dust but to remove it with a damp cloth. To secure ventilation she will have to see that cross-ventilation is adequately carried out by arranging that the windows on opposite sides of the ward are kept constantly open, the only

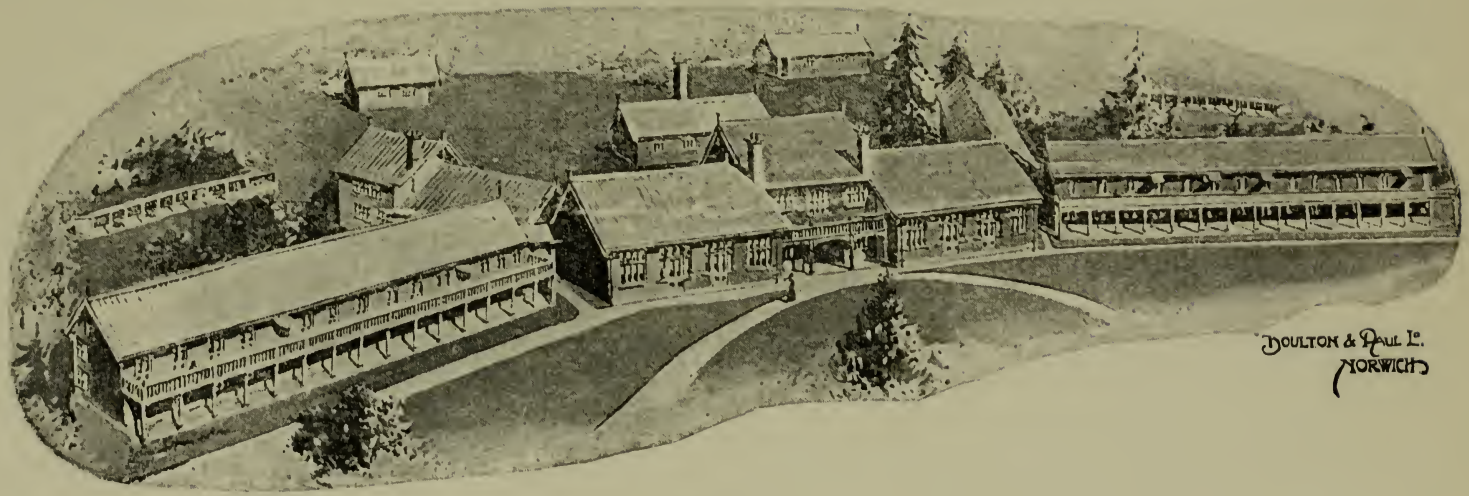

FIG. 12.

exceptions being with wind and driving rain. It is surprising how well patients stand a rigorous open-air treatment. Only occasionally with those received in winter does the system have to be relaxed. The nurse must see that patients are not exposed to wind which increases the cough, or directly to hot sun which increases pyrexia. Mere open-air treatment is not sufficient. Patients who are feverish on admission must be treated for this symptom by **rest.**

If the fever is slight, not over 99° F., simple rest in bed may be sufficient, visits not being allowed if they excite the patient, and no business or other matters tending to excite him should be permitted. He will not require the bed-pan, and will wash and feed himself.

If the fever is high, over 101° F., absolute rest may be ordered by the doctor, in which case the patient will be treated as a typhoid patient. He will not feed or attend to himself in any way. The nurse must wash him, carefully, a little at a time, and without disturbing him. He must not be allowed to sit up in bed. If neither of these "rest" methods succeed in reducing the temperature, the doctor may give tuberculin or order slight exercise in the hope of producing a reaction which will increase the patient's resistance to the disease. These latter methods are generally used when a month's trial of the rest treatment has failed.

When the patient's temperature has been normal for a week, he is allowed out of bed for a short time each day, generally in the middle of the day, lying on a lounge chair. Gradually the time will be increased until he is up all day. He is then able to take a gentle walk, starting with a quarter of a mile per day, and only being allowed to gently stroll. He should be made to walk with his head up and mouth closed, his chest being well expanded.

If no untoward results follow, the distance may be gradually increased until he is walking from 6 to 10 miles each day. The routine which he will now be following will be that of the majority of the patients in the sanatorium, and will be something as follows:—

7.0 a.m. Temp. taken.
8 or 8.30 a.m. Breakfast.
9.30 to 10 a.m. Rest.
10 a.m. Lunch.
10 to 12 noon. Exercise.
12 to 12.30 p.m. Rest. Temp. taken.
12.30 p.m. Dinner.
1 to 2 p.m. Rest.
2 to 4 p.m. Exercise.
4 to 4.30. Rest.
4.30 to 5. Tea.
5 to 6. Rest.
6.0. Temp. taken.
6 to 7. Exercise.
7 to 7.30. Supper.
8.0. Temp. taken.
8.30. Bed.

It will be noticed how large a part rest plays in the patient's life. Hill-climbing, if possible, may be carefully introduced into the walking exercise. The patient when he is well on in convalescence is allowed games such as draughts, chess, dominoes, etc., at the beginning, going on to bowls, croquet, and golf; and when he is able to walk 4 miles a day, he will be begun with such duties as making beds, cleaning brasses, etc., in the wards. When he has reached the maximum walking distance advised by the doctor he is begun with **graduated labour**. The principle of this is to cause the patient to absorb a small dose of tubercle poison and so increase his resistance to the disease by stimulating his body to antagonize it. In other words, by slightly activating his disease by work, to cause him to make his own tuberculin. The graduated labour will therefore need to be as carefully supervised by the doctor as if he were injecting tuberculin. Paterson, at Frimley, commenced with

Grade 1 (carrying baskets of mould), Grade 2 (small shovel), Grade 3 (large shovel), to Grades 4 and 5 (a pickaxe).

In this way, at Frimley, the patients were able to assist in carrying out various necessary works. The method, of course, can only be used to a great advantage in a large sanatorium with ample grounds, but in all sanatoria it may be applied in a modified manner, though not with precisely the same work.

Diet.—This is frequently the most difficult question to settle in a sanatorium, and is the cause of more discontent than any other. It has, of course, to be adapted in some cases to the patient, dyspeptic patients needing special treatment. Otherwise the chief difficulty is that of avoiding monotony. A good cook is almost a *sine qua non* in a large sanatorium. Since fats give more energy than carbohydrates and patients suffering from the disease are inclined to take too little, these will have to take an important place in the diet table, in such substances as fat bacon and ham and butter. The medical officer will, as a rule, be in charge of the dining-table, or at any rate make it his business to be frequently present. The table on opposite page illustrates the times of meals and what variety of food is given.

As regards the general management of cases in the sanatorium.

The temperature, in cases without fever, will be taken in the mouth at 7 a.m. and 6 p.m. In some cases the doctor may order it to be taken rectally. This is certainly the most accurate method but is inconvenient in the ward. In pyrexial cases the temperature and pulse will be taken every four hours, as also in cases being treated with tuberculin. The nurse will, of course, be careful not to interchange patients' thermometers or to use them without disinfection.

	7.30 a.m.	8.30 a.m.	10.0 a.m.	12.30 p.m.	4.30 p.m.	7.0 p.m.
Sunday	Hot milk ½ pint	Porridge and milk, cold boiled ham, bread and butter, tea, coffee or cocoa	Hot milk ½ pint	Cold beef, potatoes, vegetable, boiled raisin pudding	Tea, bread and butter, cake	½ pint hot milk
Monday	,,	Porridge and milk, bacon, egg, bread and butter, tea, coffee or cocoa	,,	Roast mutton, potatoes, vegetable, rice pudding	,,	,,
Tuesday	,,	Porridge and milk, dried haddock, bread and butter, tea, coffee or cocoa	,,	Boiled mutton, potatoes, vegetable, light suet pudding	,,	,,
Wednesday	,,	Porridge and milk, two eggs, tea, etc., bread and butter	,,	Roast pork, apple sauce, vegetable, sago pudding	,,	,,
Thursday	,,	Porridge and milk, bacon and one egg, bread and butter, tea, etc.	,,	Stew and date pudding	,,	,,
Friday	,,	Porridge and milk, fried plaice, bread and butter, tea etc.	,,	Roast mutton, potatoes, vegetable, rice and fruit	,,	,,
Saturday	,,	Porridge and milk, bacon and egg, bread and butter, tea, etc.	,,	Roast beef, Yorkshire pudding, bread and butter pudding	,,	,,

The patients who are convalescent will be weighed weekly.

The sputum of patients must be carefully dealt with. Those who are walking about will be provided with pocket spittoons. Those generally used are shown in Figs. 13, 14 and 15. The Dettweiller (Fig. 13) has the advantage of

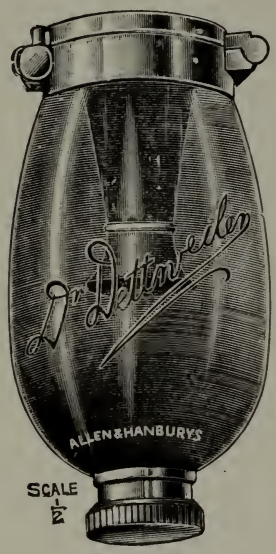

FIG. 13.

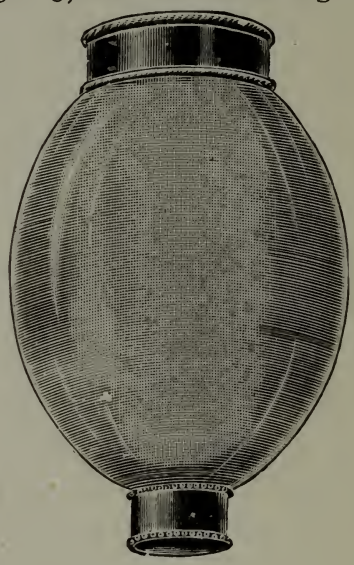

FIG. 14.

being able to be washed through and has a wide mouthpiece. That in Fig. 14 has a similar advantage. The other has the disadvantage of not being able to be mechanically cleansed but is much simpler in construction. For patients in bed the "Brompton" spitting mug (see Fig. 16) may be used, especially if a machine is in use for cleansing purposes, or the hospital mug, or perhaps better than either, Seabury's cuspidors, the cardboard section of which can be burnt. Carbolic acid, 1 in 20, will be kept in the mug or spittoon and these should be boiled daily. The handkerchiefs supplied to patients should be kept in a special bag supplied for the purpose.

All the linen used in the wards should be steam disinfected before being washed at the laundry. Each patient will be given separate eating utensils and these must be kept separate. If well enough the patient may cleanse them himself.

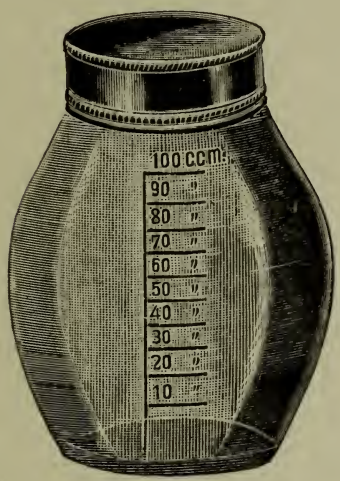

FIG. 15.

FIG. 16.

The cases which are admitted to a sanatorium will, as a rule, be of two classes. 1. Early cases, or those more advanced but with good resistance in whom a prospect of a cure can be expected. 2. Advanced cases who are admitted for teaching purposes only and who will not be detained for more than a month or two.

These cases will be kept in separate wards from the early ones, for obvious reasons.

The educative value of the sanatorium is not the least of its valuable functions, especially with advanced cases. They will learn there the importance of the proper disposal of their sputum, the value of regular feeding, and the import-

ance of living a healthy, hygienic life. They will soon appreciate the benefit they derive from open windows and fresh air. The medical officer in charge will frequently enforce some of these facts by lectures to the convalescent patients and will point out how they can assist in the prevention of the disease by their mode of life when they leave the sanatorium.

Some cases, too advanced to hope for much permanent benefit from treatment, will be sent to the sanatorium chiefly with a view to the educative influence which it will exert.

There are certain complications of the disease which the nurse may have to deal with, and which are as follows:—

1. *Hæmoptysis.*—All degrees of this should be reported to the doctor. He may not regard "staining" only of the sputum of much importance. If the bleeding is a sudden attack more or less profuse, the patient should be got to bed at once and placed in a semi-recumbent position with the head and shoulders a little raised. The treatment will depend on the doctor under whom the nurse is working. Some prefer to have the patient more upright, and whilst some like to have an ice-bag applied to the chest and ice given to suck, others like neither. The main thing is to keep the patient quiet and free from cough. He must be calmed and reassured by the nurse. The patient will be put on light diet, the bowels will be made to act freely and probably the doctor will order morphia to ensure complete rest should the hæmorrhage have been profuse. Or again, he may order an immediate inhalation of amyl nitrite.

2. *Laryngitis.*—This is a most serious complication usually coming in the later stages not many months before a fatal issue may be expected. It is very rarely that the disease

occurs first in the larynx. The patient's condition in this stage is a very sad one. He cannot speak or swallow without pain. Very little can be done for him, and he will be instructed to write instead of talk. Cocaine and orthoform may be applied to the larynx but the outlook is hopeless.

3. *Enteritis.*—This complication is also one occurring in the last stages of the disease. It is signalized by abdominal pain and constant diarrhœa, and little can be done for it. It will be treated by dieting with peptonized milk, meat juice, Benger's food, etc. The doctor may have recourse to opium. The result is hopeless. The nurse will need to carefully attend the patient, the frequent changing necessary may result in bed-sores if the greatest care is not taken.

4. *Pleurisy.*—This is signalized by an acute pain in the side with a rise of temperature and cough. The doctor may order the chest to be strapped, and the condition may be followed by effusion. Unless the shortness of breath produced by the fluid is very considerable the effusion will not be tapped, as it will act like the nitrogen in the pneumothorax treatment, which is described in the next chapter.

5. *Night sweats.*—These should only very occasionally occur in well-managed sanatoria, and are, as a rule, due to insufficient ventilation or to very high fever. It is usually sufficient where they do occur in other cases to simply make a change of night-gown and bedclothes if they have been excessive.

CHAPTER VII.

THE TREATMENT OF PULMONARY TUBERCULOSIS.

3. *Other Modes of Treatment.*

BESIDES tuberculin and the sanatorium, another form of treatment has been more recently introduced, viz. the *Pneumo-thorax treatment.* The principle of this is to introduce into the pleural cavity sufficient nitrogen gas to cause the lung to collapse and to repeat the process as fre-

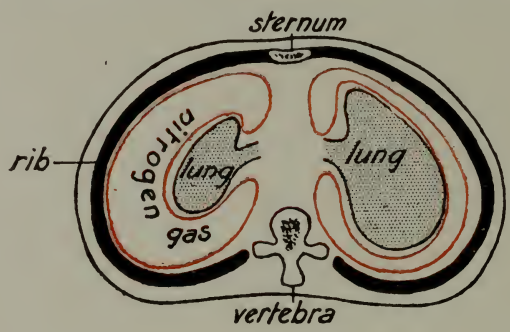

FIG. 17.
Diagram illustrating Pneumo-thorax treatment. (One lung is collapsed.)

quently as is necessary to cause the collapse to continue, as the nitrogen is slowly absorbed by the lung. In this way the diseased lung is allowed complete rest, and so time to recover. Thus it is treated as cases of early surgical tuberculosis are treated.

The apparatus used is of the type here illustrated. The patient is first given $\frac{1}{4}$ gr. morphia, the site of injection is

then anæsthetized with novocaine and the special needle used is thrust into the axilla, below the sixth rib. When

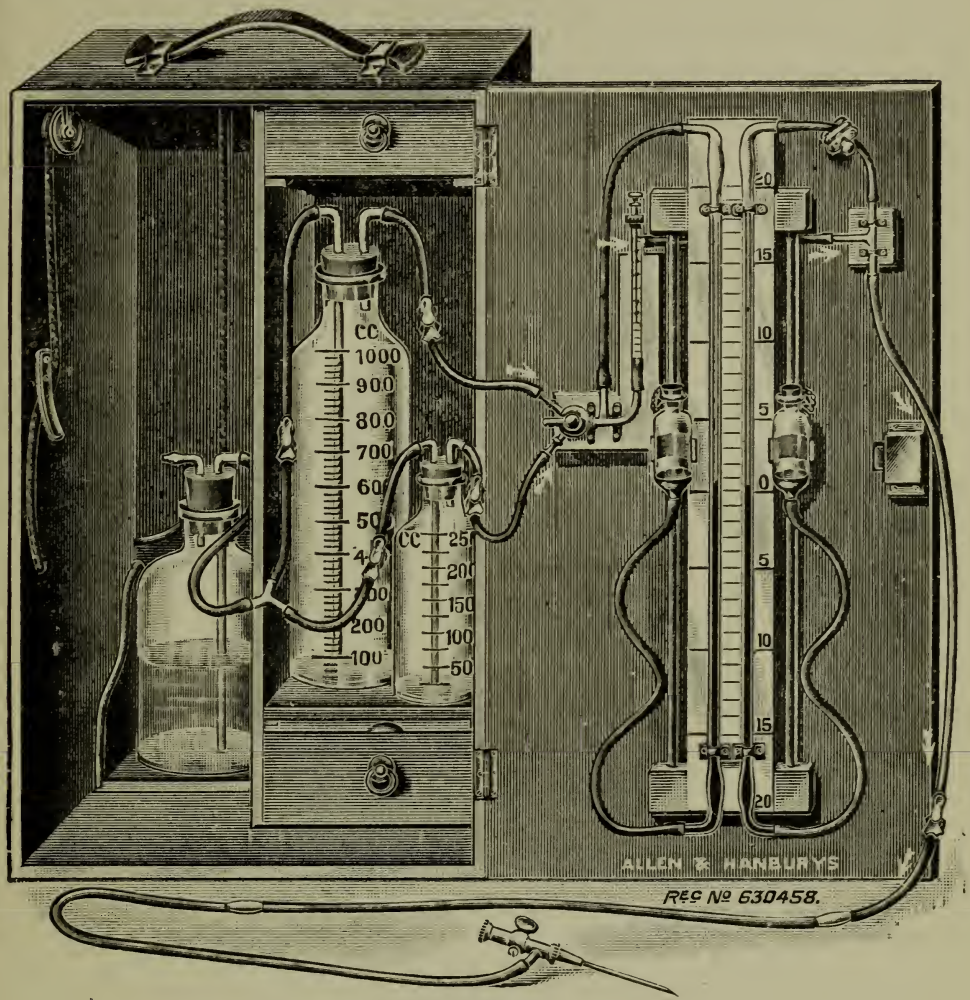

FIG. 18.

it is in the pleural cavity the liquid in the manometer will oscillate with the respirations, and the nitrogen will then be allowed to enter the pleural cavity.

There are many difficulties connected with the operation such as pleural adhesions, and the treatment is at present only advised in cases fairly advanced with one lung affected. By the collapse of the lung, all danger of hæmorrhage is avoided, the cough and sputum immediately lessen and in successful cases the patient's condition improves. The process of filling has to be repeated every six weeks, and is kept up for about a year.

Beyond the Pneumo-thorax, Tuberculin, and Sanatorium treatments little more can be done for the patient. Mention must be made of *continuous inhalations* which are carried out by means of a Yeo's mask, illustrated in Fig. 19, the inhalation used being a mixture of creosote. This method is no doubt

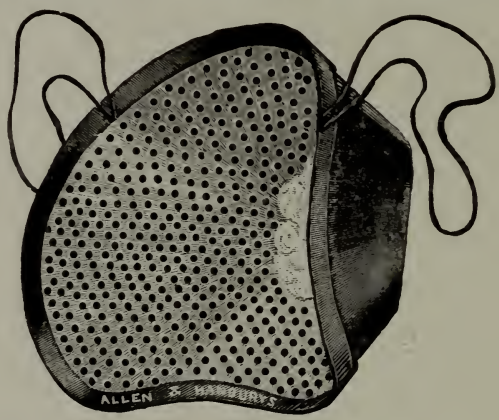

FIG. 19.

of value in cases infected by other organisms as well as the tubercle bacillus. Various cough mixtures will be prescribed, and in patients attending a dispensary, cod-liver oil and malt will be frequently prescribed. The value of cod-liver oil in the treatment of tuberculosis is undoubted, and recent experiments have tended to show that it has a decidedly antagonistic action to the growth of the tubercle bacillus.

CHAPTER VIII.

OTHER FORMS OF TUBERCULOSIS.

WHILST, from the Public Health point of view, tuberculosis of the lungs is of primary importance from its being a source of danger to others, there are many other forms of tuberculosis, about which the nurse should know something. These diseases are not infectious to others unless there is some discharge present containing the tubercle bacillus.

1. *General tuberculosis*, or acute miliary tuberculosis, has been already referred to. It may occur in pulmonary tuberculosis, but is more common in children after a disease like measles or whooping-cough. The tubercle bacilli obtaining entrance to the blood and general circulation, a fatal result rapidly ensues.

The disease may simulate typhoid fever, or there may be more signs of the lungs being affected by there being a good deal of blueness of the face and difficulty in breathing. In children, the membranes covering the brain often are most attacked, and there are then the symptoms of *meningitis*. Frequently the child is convalescent from an illness but he does not get on as he should do. He refuses his food, is irritable and fretful, although there seems nothing definitely wrong with him. He then develops headache, and has attacks of screaming from the pain. Attacks of vomiting, not related to his meals, will also occur. He gradually becomes drowsy, the temperature rises, occasionally he gets

convulsions, but finally becomes comatose with head retracted, the muscles of his legs more or less rigid, and death ensues.

The disease lasts about three weeks from the first definite symptoms arising, and no treatment is of any value. Nasal feeding will probably be resorted to

2. *Tuberculosis of the spine.*—This is a good example of tuberculosis attacking bone. It is also called Spinal caries, or "Pott's disease". It most often attacks the vertebræ in the lower dorsal region, and the common early symptoms are pain in the stomach and upon pressure on the spine at the spot affected. If neglected, the spine becomes deformed and the patient becomes hunch-backed. Later on abscesses may form either in the back, or the pus may find its way along the psoas muscle to one side of the abdomen forming the so-called "psoas-abscess". The treatment of tuberculosis of the spine is absolute rest, and in children this is most frequently obtained either by a Phelp's box, or a double Thomas' Splint.

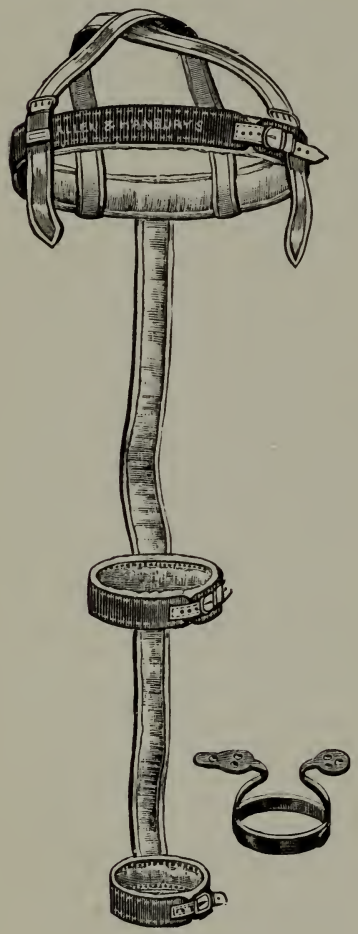

FIG. 20.

If abscesses form, an operation may be necessary.

3. *Tuberculosis of the joints.*—The most common joints to be attacked are the hip and the knee. More rarely, the hand, foot, elbow, and shoulder are attacked. The disease may begin in the bone or in the synovial membrane which lines the joint. In the *knee*, there will be a gradual swelling of the one affected with pain on movement, and the knee will become bent. In the *hip*, there will be at first slight limping, and then pain which will be worse at night. This will be followed by the leg on the diseased side being drawn up and apparently shorter than the other. If neglected, abscesses will form. The treatment of both these conditions will be to rest the joint affected. To the knee, a Thomas' knee splint or a plaster of paris splint is applied. In the case of the hip the first treatment is complete rest in bed. Later a Liston's splint will be applied if necessary, and after that a Thomas' hip splint will be used, illustrated in Fig. 20. In the later stage of a neglected case, operations will be necessary to remove the diseased portion of the bone.

4. *Tuberculosis of glands.*—Tuberculosis of the glands in the neck is very common, especially in children. If neglected they suppurate and abscesses are formed. The general health of the children requires attention, and the sites by which the infection may be entering, removed. These may be carious teeth, enlarged tonsils and adenoids. Cod-liver oil and malt are useful and an open-air life will be advised. Tuberculin may be of service.

5. *Tubercular peritonitis.*—In children a common affection is for the glands in the folds of the peritoneum connecting the bowels to the back wall of the abdomen, to become tubercular. Secondarily to this the peritoneum or membrane covering the intestines and abdominal wall may

be attacked, and fluid may accumulate in the abdominal cavity, causing an enlargement of the abdomen. In some cases an operation will be needed to allow this fluid to escape, whilst in others, dietetic and general hygienic measures will be adopted by the doctor.

CHAPTER IX.

THE TUBERCULOSIS DISPENSARY.

THE tuberculosis dispensary has various functions which have been well summed up in the Report of the Departmental Committee of the Local Government Board on Tuberculosis in the following five groups :—

1. Receiving house and centre for diagnosis.
2. Clearing house and centre for observation.
3. Centre for curative treatment.
4. Centre for examination of contacts.
5. Centre for after care.
6. Information bureau and educational centre.

(1) Patients will come to the dispensary, either voluntarily or will be sent by doctors. Children will be sent also by the school medical inspector for diagnosis. The tuberculosis officer will encourage the sending of doubtful cases in order to be able to make the diagnosis early. To facilitate diagnosis every up-to-date and well-equipped dispensary will be furnished with an X-ray plant and a suitably equipped bacteriological laboratory.

(2) All patients suffering from pulmonary tuberculosis should be drafted to the dispensary, there to be recommended for suitable treatment. They would be either retained for observation, recommended to a sanatorium or hospital, or treated at home.

(3) The special curative treatment at the dispensary will be that of tuberculin, the thermometers necessary being supplied free to the very poor, and at a small cost to others.

(4) The dispensary is the most suitable place for the ex-

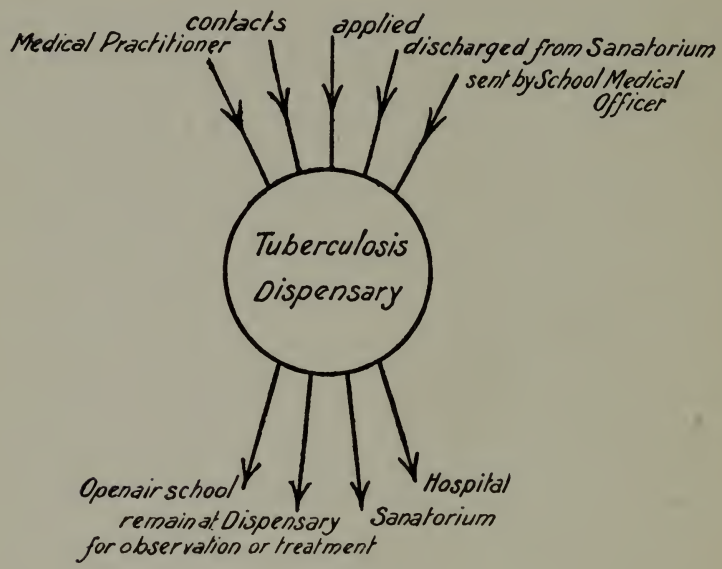

FIG. 21.

amination of "contacts," i.e. those who have been in contact with a patient who is suffering from the disease. While this may be done at home in some cases, it is more satisfactory to have cases examined at the dispensary.

(5) All cases discharged from hospitals or sanatoria should be referred to the dispensary. The advantage of tuberculin treatment following on a course of sanatorium treatment has already been mentioned, and suitable work can also sometimes be obtained for patients, though the difficulties attending this are frequently very considerable.

(6) The dispensary should act in conjunction with

medical practitioners who may attend and see the latest modes of diagnosis.

Besides the work of diagnosing the disease of patients and recommending them suitable treatment, the dispensary will have great value in preventing the disease. Its work in this direction will be on the following lines:—

(*a*) The examination of "contacts" and so early discovery of the disease.

(*b*) The drafting of children who are not actually tuberculous but may appear to be such as are likely to become so, to open-air schools or other institutions.

(*c*) The obtaining admission to suitable institutions of those too advanced for other treatment, and who by their home circumstances are a source of infection.

(*d*) The supply of pocket spittoons, disinfectant and paper handkerchiefs free to the poor where thought desirable.

(*e*) The advice given by suitable literature and word of mouth to patients attending the dispensary. If the accommodation is adequate lectures should be given at intervals by the Tuberculosis Officer on the causes of the disease and how the disease can be prevented. Lectures should also be given on the subjects of general hygiene, and on how to obtain the best food value for the least expenditure.

The dispensary must be fully affiliated with local charitable agencies, a Care Committee should be appointed to assist in the oversight of its patients, and to obtain relief where necessary. It is advisable to have the dispensary linked up with a hospital where beds for observation may be used and where surgical cases and those requiring dental treatment can be drafted.

The *nurse's duties* at the dispensary will be very simple. She will fill up the case sheets giving history of disease, etc.,

and weigh the patients, taking into consideration increase of weight which may be due to change of clothes and pregnancy. She will instruct patients so required how to take their temperatures and will receive back the card containing the record on their re-visit, and enter the results on a temperature chart for the doctor. She will attend to the sterilizing, by boiling, of the hypodermic syringe and needles for tuberculin injections, and if it is considered necessary by the doctor, will cleanse the skin of the patient's arm or shoulder as he may direct. Different doctors prefer different sites for the injection of tuberculin, and some consider that the cleansing of the skin is not essential.

If the nurse's duties are confined to the dispensary, the above will comprise them all. If, however, she visits the homes in addition, others will be added as follows :—

In every dispensary an inquiry book should be kept, in which the names of patients who have ceased attending for a fortnight are entered to be inquired into by the visitor. In addition, all cases which have entered a sanatorium or other institution, or have died, have their names entered here in order that disinfection of their homes may be carried out. The names of patients who have been discharged from a sanatorium or hospital should also be entered so that if they are not under suitable medical supervision they may be persuaded to attend the dispensary.

The names of patients who have entered hospitals and sanatoria are obtained from the Medical Officer of Health to whom they are notified on Form C, under the Public Health (Tuberculosis) Regulations, 1912. The names and addresses of patients discharged from such institutions may also be obtained from him, as they are notified on Form D, under the same Regulations.

If the visitor does not perform the nurse's duties she will attend at least once a week at the dispensary for the purpose of obtaining the names from the inquiry book and giving information of those she has visited. Every case which is notified must be visited and the information obtained similar to that on the illustrated card.

	Contacts.		
	Name.	Age.	Date and Result of Examination.
Name Age Address Date of Visit Date of Notification Dr. Occupation If at work If in bed If insured Last date at work Length of illness Diet Where receiving treatment If had sanatorium treatment Any other cases in home or family with date Any suggested source of infection If separate bedroom If separate bed Disposal of sputum Cleanliness of house Ventilation Any insanitary conditions No. of rooms in house No. of rooms of patient No. in patient's family No. of other occupants Advice given or action taken			

The card when filled up will be presented to the Tuberculosis Officer who will decide whether or not he will visit the house himself for any reason, and he will give instructions as to re-visiting. As a rule each case should be re-visited once a quarter, except where everything is found to be satisfactory, and the card again presented to the Tuberculosis

Officer with any additional information obtained. In this way a very effective oversight can be obtained of all cases of tuberculosis in the district.

The precise method in which the dispensary will be worked will vary according to the character of the district. The description given so far will apply chiefly to one established in a town. Where the dispensary is established in a country district the general system will be the same but the difficulties in linking up the work will be increased, the visits of the doctor to the dispensary will be less frequent, and in consequence of the wider area the home visitation will also be less frequent. Other steps may be taken to increase the efficiency of the work. The provision of shelters supplied on loan to suitable cases is useful. In Wales, useful educational work has been done by means of an exhibition illustrating the causes and effects of tuberculosis and by a caravan which is suitably staffed by lecturers on hygiene and cookery, and which visits the country districts.

CHAPTER X.

THE TUBERCULOSIS VISITOR'S DUTIES.

THE main outline of these has been given in the previous chapter, but some amplification is required.

The visitor should pay special attention to any dampness in the house, as this can be remedied by compelling action to be taken. The question of overcrowding, i.e. less than 400 c. ft. air space per adult, is of great importance. In London the advisability of dealing with this is often doubtful as the patient will readily move, and be lost sight of. Probably more can be done by tact, and by dealing with the cause of the overcrowding than by compulsion. The disposal of the sputum is of importance, and the necessity of using a spittoon which must be regularly and efficiently cleansed, its contents having been thrown down a W.C., must be insisted on.

The sleeping arrangements must be inquired into. If the patient (provided he is suffering from pulmonary tuberculosis) is sleeping with another, the danger of this must be pointed out. Man and wife should sleep in two single beds instead of a double one. The family which has been in contact with the patient must be asked about, their names taken down and special inquiries made about them to ascertain if they have any early symptoms of the disease. These contacts especially should be persuaded to attend

the dispensary for examination. A contact register should be kept, the names entered, and the date and result of examination by the doctor filled in. In this way some unsuspected cases of tuberculosis will be revealed. If the patient is not being treated by a medical man the visitor will advise his attendance at the dispensary, and if neglected, or too ill to attend there, his transference to the Union Infirmary. She will inquire into the dietary of the patient, and in poor homes will give some information about proper food and cooking. Attention should also be paid to the proper storage of food. She will see that adequate ventilation of his rooms is carried out, and will instruct him in such matters as being careful to cough into his handkerchief, to refrain from kissing, to keep his eating utensils separate, especially when the disease is in an advanced stage. She may have to give advice on the danger to life of a phthisical woman bearing children, this as a rule greatly aggravating the disease, and phthisical women should also be advised not to suckle their children. The grave risks attaching to marriage should also be emphasized. She will take steps to secure that where necessary the premises are suitably cleansed, and report any question of dampness to the Sanitary Inspector. She will also arrange with the Public Health Department for disinfection to be carried out in those cases where such is considered necessary by the Tuberculosis Officer, or the Medical Officer of Health, especially in such cases as those mentioned in the last chapter.

It will be seen that the duties which the visitor performs are among the most important of those which are relegated to the dispensary. The qualifications which she should possess are many, and unfortunately held by few, whilst the remuneration offered by Local Authorities is frequently

insufficient to attract very many to obtain them. She should be a fully trained nurse with sanatorium experience, and she should also hold a sanitary inspector's certificate.

The way in which she performs her work, however, depends far more on the personality of the individual than the paper qualifications which she has. It is necessary that she should be interested in the work and make it her business to become acquainted with the various charitable and other agencies which are likely to assist her. She must be possessed of a good deal of knowledge of human nature and have the necessary tact to deal with it. She should endeavour to make her visits to homes so agreeable and useful to their inmates that they will not consider her following visits an intrusion. The visitor, if possible, should never adopt a negative policy in her work and should not condemn without being able to suggest a practicable remedy. It is necessary then that she should posses a fair knowledge of cookery and be able to instruct where necessary how to obtain nutritive food at a cheap rate. On the whole she will find the sufferers from tuberculosis optimistic as to their recovery, except when they become first aware that they have the disease. It will be her duty to encourage this spirit while laying emphasis on the things which will hinder the patient's prospects.

CHAPTER XI.

LEGISLATION AND TUBERCULOSIS.

According to the Registrar General's Report for 1910, the deaths in England and Wales from all tuberculous infection totalled 51,317, of which 36,334 were pulmonary. It is therefore not to be wondered at, that attempts have been made to limit the disease by legislation. The notification of the disease enables the Sanitary Authority to advise those affected how to live, by means of its Health Visitors, and to deal with any questions of overcrowding or insanitary conditions which may arise.

In 1908, **The Public Health (Tuberculosis) Regulations** of the Local Government Board made compulsory the notification of all cases of Pulmonary Tuberculosis occurring in Poor Law practice.

In 1911, **The Public Health (Tuberculosis in Hospitals) Regulations** made compulsory the notification of all such cases attending Hospitals.

On 1st January, 1912, came into operation **The Public Health (Tuberculosis) Regulations, 1911,** which required the notification of all cases of Pulmonary Tuberculosis, whether occurring in private practice or not. On 19th December, 1912, the Local Government Board extended the provisions of these regulations still further when they brought

into operation **The Public Health (Tuberculosis) Regulations, 1912.**

These regulations consolidated all the foregoing Orders upon the subject of the notification of tuberculosis, and extended their provisions to all cases of that disease whether pulmonary or otherwise. These regulations specially provide for the confidential treatment of all such notifications and prohibit any action which may injuriously affect the patient's means of livelihood.

They further provide for the notification to the Medical Officer of Health of all cases which are admitted or discharged to or from hospitals and sanatoria, the Medical Superintendents and other officers of such institutions being required to submit a weekly return on Forms C or D, which have been referred to in the chapter relating to the work of the dispensary.

Under these regulations the Medical Officer of Health or an officer acting under his directions "shall make such inquiries and take such steps as are necessary or desirable for investigating the source of infection, for preventing the spread of infection, and for removing conditions favourable to infection".

The Local Authority may, on the advice of their Medical Officer of Health, supply all such medical or other assistance, and all such facilities and articles as may reasonably be required for the detection of tuberculosis. Further, they may provide and publish or distribute suitable summaries of information and instruction respecting tuberculosis.

The National Insurance Act, 1911, makes a great advance in the methods of dealing with tuberculosis. Section 16 compels insurance committees to make arrange-

ments for providing treatment for insured persons suffering from tuberculosis, in sanatoria and otherwise.

Section 17 enables insurance committees, if they think fit, to extend the treatment to dependants.

Section 64 allows the Local Government Board to authorize county councils to provide, manage, and maintain sanatoria and give grants to their support.

All applicants for sanatorium benefit under this Act are required to fill up a special form of application (Form S.B. 1), which may be obtained from local insurance committees and medical officers of health. These forms, after the medical report has been filled in, are sent to the Clerk to the Insurance Committee, when, if all is in order, arrangements are made for the Committee's expert adviser to examine him, and treatment is ordered either (1) in a sanatorium, (2) at a dispensary, or (3) domiciliary. In suitable cases extra nourishment in the form of milk and eggs can also be ordered. Many local authorities have extended the sanatorium benefits to uninsured persons, and it is to be hoped that in the near future this will become general.

Difficulties in securing benefits have occurred in many places, owing to there being no suitable sanatoria in existence. This, however, is being gradually amended although much remains to be done, especially in the securing of adequate hospital accommodation for advanced cases, to whom at present the Union Infirmary only is open.

In this brief résumé of the legislation dealing with tuberculosis, mention must be made of the by-laws, now very general, prohibiting promiscuous spitting.

In Liverpool and St. Helens special Acts of Parliament are in force, which deal with patients who are sources of infection, and are living in houses where insufficient iso-

lation can be obtained. Such can be compulsorily removed to a sanatorium or hospital. If such Acts became general a very great improvement could be brought about in many homes, not that the Acts would be commonly brought into use, but the threat of doing so would produce the desired remedy.

No mention has been made of the regulations dealing with the supply of milk, clean, and free from tubercle bacilli, since the administration of these does not fall within the scope of the work of a tuberculosis visitor, although their importance in dealing with the prevention of consumption is very great.

In the last place, reference should again be made to the Departmental Committee's reports on Tuberculosis which deal in a very complete manner with the whole question, and whose advice the Local Government Board has mainly followed in sanctioning the various local schemes which have been put forward.

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